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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Wolfgang SCHMID et al.

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SUPPLEMENTAL INFORMATION DISCLOSURE STATEMENT

S I R:

This supplements the IDS dated November 2, 2006 which submitted the Pelz document ("Pelz") and the IDS dated November 21, 2006 which submitted the Michalzik document ("Michalzik"). Both documents were submitted in the German language.

An explanation of the relevant portions of Pelz and Michalzik is provided below:

Explanation regarding Pelz

This document is dedicated to the characterization and implementation of an intermixing process for quantum film lasers based on the material system InGaA1As.

Various methods for quantum well intermixing, such as IFVD (impurity free vacancy disorder), ion implementation induced intermixing, LID (laser induced disorder) and dopant

diffusion induced intermixing, are presented. The focus of the thesis is on IFVD and Zn diffusion induced intermixing.

Both IFVD and Zn diffusion are studied for structures having either a Si_3N_4 or a SiO_2 passivation. Both methods enable a blue shift of the laser emission wavelength. Zn diffusion is found to be more effective for devices having a Si_3N_4 passivation, whereas IFVD is better suited for devices with a SiO_2 passivation.

Explanation regarding Michalzik

This document is dedicated to the modelling and to the design of laser diodes having a vertical resonator. The structuring of the book is as follows:

Chapter 1	Introduction
Chapter 2	One dimensional description of the laser resonator
Chapter 3	The active zone made from InGaAs-GaAs
Chapter 4	Current and loss power density
Chapter 5	Calculation of the laser heating
Chapter 6	Transversal mode structure
Chapter 7	Self consistent laser model
Chapter 8	Summary and outlook

Graphs of interest with respect to the invention are shown in Figure 3.5 on page 49 of chapter 3. In this chapter, the material gain properties of strained quantum wells are studied. This is done by means of a modelling of the band structure in quantum wells. Figure 3.5 shows exemplary results obtained from this model simulating the optical gain as a function of the wavelength for an $In_{0.2}Ga_{0.8}As$-GaAs quantum film. In the graph on the left hand side, curves with varying carrier densities are shown, while the temperature is kept constant at room temperature. The graph on the right hand side shows curves at different temperatures for a constant carrier density.

Regarding this chapter, Michalzik states in the summary that vertical emitting lasers exhibit a detuning of the laser mode with respect to the gain spectrum. He argues that this detuning can be exploited for obtaining lasers that are independent from the current density and the output power.

In chapter 5, the temperature profile in the laser is studied by solving heat flow equations. With regard to this chapter, Michalzik concludes that high thermal resistances can occur in vertically emitting lasers with small emission surfaces, which is found to be problematic in terms of increasing threshold current densities. In order to address this issue, he proposes applying a heat spreading layer or mounting the laser onto a heat sink with its epitaxy side facing the heat sink. Furthermore, he states that decreasing the substrate thickness is not an effective means for cooling the laser.

If any fees or charges are deemed required at this time in connection with the application, the same may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,
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